

of two storms; storms V. and VI. advanced from the Pacific, crossed California and the Rocky Mountains, and thence swept eastward over the States; and storm VIII. began its course near Chicago, ran out south-eastward to near Cape Hatteras, and then recurved in the direction of Niagara, where it died out after having traced a course nearly elliptical. It is to an exhaustive treatment of a tolerably large number of instances of these different types of storms, that we must look for the key of the mystery of the genesis, progress, and termination of the cyclone which comprehends within itself by far the major portion of all weather changes. Towards this great and perhaps not far distant result, nowhere is any meteorological system making contributions so large and so effective as is Gen. Myer through the munificent liberality of the United States Government.

DIFFUSION OF COPPER IN THE ANIMAL KINGDOM

THE fact of the normal presence of minute quantities of copper in various members of the animal kingdom has been noticed by several chemists within the past twenty-five years. Kingzett states that he has invariably found it to be a constituent of the human brain, while Odling and Dupré, and Bergeron and Hôté have determined analytically the average amount of copper present in the liver and kidneys of human beings and domestic animals. In the latter case the average percentage of copper found was about 35 millionths. Some two years since Cloez examined the blood of a deer, and found it to contain 6 millionths of copper. The most interesting instance of the occurrence of copper in the animal creation is, however, that communicated by Prof. Church to the Royal Society in 1869. At this time he was engaged in the investigation of a peculiar, soluble, red colouring matter present in the wings of the Turaco, a bird from the West Coast of Africa. A thorough study of this pigment showed it to contain 5·8 per cent. of copper, and Prof. Church established for it the formula $C_{30}H_{60}O_{10}NCu$. Led to seek the source of this strange factor in the animal economy of the Turaco, he succeeded in detecting copper in the fruit of the *Musa sapientum*, which forms the chief article of the bird's diet.

To these few isolated cases of the normal assimilation of copper in the animal kingdom, Dr. M. Giunti, in the last fascicule of the *Gazzetta Chimica Italiana* (vol. ix. p. 541), adds a number of interesting and diversified instances.

His attention was first directed to the subject accidentally by finding over one-third of 1 per cent. of copper in the guano deposits from bats occurring in certain Italian caves. This led to an analytical examination of the bat, the results of which showed that about four ten-thousandths of the weight of the ashes of this animal consist of cupric oxide. Still bent upon finding a more ultimate source for the metal, Giunti has subjected to analysis quantities of the insects which form the food of the bat, and in all cases he has found copper present in greater or less amount. The quantity would seem to vary in the different orders, families, and species. Aquatic insects contain less than those found on land, and the Coleoptera appear to yield the highest percentage. Thus the ashes of *Anomala vitis* contain 0·1 per cent. of cupric oxide, and those of *Blatta orientalis* 0·826 per cent. High as this percentage seems, the amount of copper in an individual insect is infinitesimal, being, in the case of *Anomala vitis*, less than four-millionths of a gramme. Copper was also detected amongst other Coleoptera (such as *Cetonia*, *Cerambyx*, *Ateucius sacer*, *Leucus striatus*, and notably the lava of *Scyllotalpa*); amongst Diptera (*Mosca domestica*), Lepidoptera (*Vanessa cardui*, *Pieris sinapis*, *Limenites camilla*, &c.), and Hymenoptera (*Æschena maculatissima*, *Libellula depressa*, *Calabroni*, &c.).

Giunti has next sought to ascertain whether other insectivorous animals besides the bat are wont to assimilate the copper present in their insect prey. This was found to be the case with all members of this class subjected to examination, such as snakes, lizards, urchins, &c. The ashes of the latter contain from one to two ten-thousandths of copper, while the ashes of lizards contain over fifteen thousandths. In their case most of the copper is to be found in the skin of the animal.

Giunti's experiments have likewise been extended amongst the invertebrates. Various varieties of spiders; of myriapods, such as *Julus terrestris*; of isopods, such as *Armadillidium vulgare*; and of snails, have all given affirmative responses to his tests. Amongst these, *Julus terrestris* contains the largest amount of copper, its ashes showing a percentage of 0·18.

The investigations of the Italian chemist in this novel branch of physiological chemistry are still being continued, and it is to be hoped that more extended observations will inform us of the exact nature of the rôle played by cupric compounds in the animal economy.

T. H. NORTON

NOTES

NEXT week we publish an extra number entirely devoted to an account of the life and work of M. Dumas, the eminent French chemist, and one of the greatest of living Scientific Worthies. Dr. Hofmann, of Berlin, has been good enough to devote a great deal of time and research to this paper, and has treated the important subject in such detail that, owing to the pressure on our space at present, it is impossible for us to find room for this long article in the ordinary way, and we are therefore compelled to devote to it an extra number. We are sure our subscribers will give us their willing approval and support in an emergency so very special, and all will doubtless be glad to have this sketch of an eminent French chemist by so eminent a German confrère.

A PAPER has been circulated by the Perpetual Secretary of the Paris Academy giving notice that M. Maindron has been officially commissioned to collect under their authority the archives of the Academy, in a locality belonging to the Institute. Persons possessing documents available for that purpose are requested in the name of science kindly to send them. A fair example has been recently given by M. Bornet, whose liberality has been publicly acknowledged. M. Etienne Charavay, the expert in autographs, has recovered on behalf of the Institute a number of documents which had belonged to the Academy.

THE Society for the Promotion of Hellenic Studies, which was inaugurated in June last, held its second general meeting on Thursday, January 22, at 7, Adelphi Terrace, Mr. C. T. Newton in the chair, when the rules drawn up by the Committee were adopted, the Bishop of Durham elected President, and other officers settled as follows:—Vice-Presidents: Lord Morley, Mr. Justice Bowen, the Dean of St. Paul's, M. Gannadius, Mr. Newton, Mr. E. Maunde Thompson, the Master of Trinity College, Cambridge, Prof. Colvin, Rev. H. F. Tozer. Prof. Sayce, Prof. Jebb, and Prof. T. K. Ingram. Council: The Bishop of Lincoln, the Dean of Westminster, the Dean of Christchurch, the Rector of Lincoln College, Oxford, Sir John Lubbock (Treasurer), Sir Charles Dilke, Professors Bryce, Hott, Kennedy, Mahaffy, B. Price, H. J. S. Smith, Tyrrell, Messrs. A. J. Balfour, M.P., Oscar Browning, J. Bywater, W. W. Capes, H. O. Coxe, T. Chenery, E. A. Freeman, Percy Gardner, George Macmillan (Hon. Sec.), Ernest Myers, D. B. Monro, J. Cotter Morison, H. F. Pelham, F. C. Penrose, Walter Perry, J. A. Symonds, and Oscar Wilde. The objects of the Society, as stated in the outset of the Rules, are:—1. To advance the study of Greek language, literature, and art,

and to illustrate the history of the Greek race in the ancient, Byzantine, and Neo-Hellenic periods, by the publication of memoirs and unedited documents or monuments in a journal to be issued periodically. 2. To collect drawings, fac-similes, transcripts, plans, and photographs of Greek inscriptions, MSS., works of art, ancient sites and remains, and with this view to invite travellers to communicate to the Society notes or sketches of archaeological and topographical interest. 3. To organise means by which members of the Society may have increased facilities for visiting ancient sites and pursuing archaeological researches in countries which, at any time, have been the sites of Hellenic civilisation.

AMONGST the prizes offered by the Istituto Reale Veneto di Scienze e Lettere at Venice we mention the following:—(1) 1,500 lire (about 58*l.*) "for a detailed description of the determinations hitherto made of the mechanical equivalent of the heat unit, investigation of causes, &c.;" (2) 3,000 lire (116*l.*) "for a representation of the advantages which the application of physics has brought to medical science, and to clinical medicine in particular;" (3) 3,000 lire "for a summary of the recent investigations in theoretical hydrodynamics, followed by a representation of the true and essential progress made in this part of scientific mechanics;" (4) 3,000 lire "for a description of the most recent hypotheses in physical science concerning the phenomena of light, heat, electricity, and magnetism, followed by an indication of the changes which scientific language would have to undergo in order to be in accordance with the best founded theories, this indication to be illustrated by some examples describing some of the principal phenomena." The competition for the first and fourth of these prize-themes ends on March 31 next, that for the second and third on March 31, 1881. For further details we must refer our readers to the Institution itself.

ON his passage through Rome, Dr. Gerhard Rohlfs was received in special audience by the King of Italy, who personally decorated the great traveller with the Commander Cross of the Italian Order of the Crown.

THE Royal Academy of Sciences at Turin has awarded the Bressa prize for the four years 1875 to 1878, to Mr. Charles Darwin.

WE had occasion some time ago to call attention to the excellent scientific work which is being carried on at the Carlsberg Laboratory, Copenhagen. This laboratory of research, it will be remembered, was founded and endowed by Mr. J. C. Jacobsen with the intention of aiding, as far as possible, in placing upon a secure scientific basis the technical processes of brewing and malting. We have now before us a Report of the work carried out during the past year. This is published under the title of "Meddelelser fra Carlsberg Laboratoriet" by the committee of management appointed by the Royal Danish Academy of Sciences. The original report is in Danish and is accompanied by a very full *résumé* in French. We append the titles of the principal papers embodied in the Report:—"Contributions à la Connaissance des Organismes qui peuvent se trouver dans la Bière et le Moût de Bière et y vivre," par E. Chr. Hansen. "Sur l'Influence que l'Introduction de l'Air atmosphérique dans le Moût qui fermente exerce sur la Fermentation," par E. Chr. Hansen. "Recherches sur les Ferments producteurs de Sucre," par J. Kjeldahl. (1) Recherches sur la Diastase; (2) Recherches sur la Ptyaline (Diastase de la Salive).

WITH regard to distinguishing artificial from natural butter, M. Donny remarks, in a recent note to the Belgian Academy, that the two behave very differently when heated between 150 and 160 degrees in a capsule or test-tube. At this temperature artificial butter produces very little froth, but the mass undergoes a sort of irregular boiling, accompanied by violent jerks which

tend to project some of the butter out of the vessel. The mass grows brown, but this is by reason of the caseous matter separating out in clots on the walls; the fatty portion of the sample sensibly retains its natural colour. Natural butter, on the other hand, heated to 150° or 160° produces abundant froth, the jerks are much less pronounced, and the mass grows brown but in a different way. A good part of the brown colouring matter remains in suspension in the butter, so that the whole mass has a characteristic brown aspect similar to that of the sauce called *au beurre noir*. All natural butters behave thus, and it is strange, M. Donny says, that this simple method of distinguishing natural from artificial butter has not been indicated before.

A BODY of Russian *savans* is expected to go next spring into the Slavonic Balkan provinces to study their geology and ethnographically examine the palæographic architectural remains. The expenses of this expedition are to be defrayed by the Russian Geographical Society and a Slavonic committee.

THE death is announced at New Braunfels, in Texas, of Ferdinand Lindheimer, a German botanist, long settled in Texas, for the botany of which he did much by the valuable collections he made.

SEVERAL shocks of earthquake were felt at Havana on the night of January 22. On Sunday last two slight shocks were felt at Carlsruhe.

A MUNICH correspondent describes an interesting anatomical model recently constructed by Prof. Rüdinger of that city. The model represents a whole human body, life-size, which can be taken to pieces in eight different ways. The sixteen section planes thus obtained show most minutely all anatomical details. The model was executed, under the learned professor's direction, by Messrs. Zeiller.

THE *Gazette de Lausanne* of January 20 publishes a very interesting letter by Dr. Forel, on the probability of the Lake of Geneva being frozen during this winter. After having made several measurements on January 15, Dr. Forel proved that the temperature of water throughout the lake (at a certain distance from the shores) was on that day equal to 5°·2 Celsius. Now comparing this figure with the temperature of water measured at various depths on October 23, 1879, he concludes that the water of the lake has lost during eighty-five days no less than thirty calorific units for each square centimetre of its surface, and that it must lose twenty-four units more to reach the temperature of maximum density (4° Celsius), when a superficial freezing might become possible. The laws of freezing are but imperfectly known; but applying to the Lake of Geneva the results of measurements he has made during December last on the frozen Lake Morat, Dr. Forel concludes that the waters of the former lake must lose eight calorific units more to lower the temperature of the water at the surface to the freezing-point. Thus the waters of Lake Lemman must lose altogether thirty-two calorific units per square centimetre of surface before any freezing would become possible. The lake having lost but thirty units from October 23 to January 15, we ought to experience a period of cold of the same intensity as that which was experienced during the last three months, for the freezing of the lake. But, according to the computations of Prof. Plantamour, it would be highly improbable that the cold December of 1879 should be followed by a January as cold as that of 1830. Thus, it is highly improbable that the Lake of Geneva will freeze during this year, but it is possible that the "Little Lake" (*i.e.*, its south-western part) might freeze in January. January, however, is near an end, and we have not yet heard of the lake being frozen.

THE ice on the Loire continues to occupy the French engineers. The works are proceeding actively but not very

favourably; more frosty weather having prevailed the water freezes behind the boats of the men trying to open a channel in the ice-barrier. Immense disasters are anticipated from the thaw if some means are not found to work more effectually. It is stated that the block was formed principally in consequence of the situation of the bridge of Saumur, which some competent engineers proposed to demolish many years ago as creating a danger on the occasion of inundations. The proposal was renewed during the present crisis without having met with any success.

THE Canal Saint Martin, which is used so largely for provisions of Paris, has also been entirely frozen, and the blocks of ice not having melted, as in the Seine, the Director of the City Works is busy in disencumbering it as much as possible. The difficulty is not so much in cutting the ice as in sending it into the Seine by the flood gates. Although having a length of only a few kilometres, the Canal St. Martin has so many locks, that the problem of freeing it is one of the most difficult than can be imagined.

THIS week the Commission of the Municipal Council of Paris will deliberate upon the desirability of continuing the experiments on electric lighting in the Avenue de l'Opéra. Since the article by M. de Fonville was written, the Siemens brothers have exhibited their lamps on one of the largest confectionery shops on the Boulevard Montmartre. It works very well, and creates some sensation in Paris.

AT the last meeting of the St. Petersburg Gardening Society, Prof. Beketoff made an interesting communication on the discovery in the government of Ekaterinoslav, in a wild state, of vine-plants and of the Hungarian oak (*Quercus cervis*). Both are probably degraded plants, affording remarkable specimens of natural transformism.

AMONG the numerous bibliographical indexes which have lately appeared in Russia, we notice the "Bibliography of works in Finance, Industry, and Trade in Russia, from 1714 to 1870," by M. Karataeff, which contains a complete systematic list of more than 6,000 books, papers, and newspaper notices on these subjects. The work has just appeared at St. Petersburg.

WE notice in the last number of the *Journal* of the Russian Chemical and Physical Society, the sixth part of the memoir by Prof. Beketoff, on the influence of isomerism of acids on the formation of compound ethers. As seen from numerous measurements published by the author, the isomerism of acids is of great influence on the absolute and relative rate of etherification, the primary acids being etherised in from 72 to 120 hours, whilst no less than 336 hours are necessary for the complete etherisation of several tertiary acids. Besides the rate of etherisation decreases also with the increase of the molecular weight. The same journal contains a paper by MM. Beilstein, and Courbatoff on chloranilines and chlornitranilines, and the minutes of the meetings of the Society.

THE new French cable for America has been placed at the disposal of the public for correspondence. It goes direct from Brest to St. Pierre, and from St. Pierre to Massachusetts, where it is connected with the American Telegraphic Union. A new cable will be laid from Brest to Penzance by the *Faraday* steamer, in the beginning of February, and afterwards from Penzance to St. Pierre. This second cable will be used for English telegrams.

IT is stated that a valuable bed of anthracite has been prospected at Ching-mên-chow, near Ichang on the Upper Yangtszi-kiang, and that it is already being worked. The coal district is said to extend for seventy-five square miles, and to contain ten beds of coal, one of which, at Wo-tsze-kow, is estimated to

contain 1,200,000 tons, and lying only 100 feet below the surface.

THE Cracow newspaper *Wiek* states that the Cracow Academy proposes to convoke a general congress of historians.

THE Forty-sixth Annual Report of the York School Natural History Society is on the whole favourable; good work has been done in the geological section especially.

THE annual meeting of the Yorkshire Naturalists' Union was held at Huddersfield on Saturday week, Dr. H. C. Sorby, the president, occupying the chair. There are now twenty-six societies in the Union; Prof. Williamson, of Manchester, was chosen as Dr. Sorby's successor in the presidency. The latter gave his annual address in the evening on "The Structure and Origin of Limestones."

WE have received a report of a very successful scientific exhibition which has been opened for a few days by the enterprising Dundee Naturalists' Society. We notice from the programme of the Society, that besides lectures by eminent men of science, a number of papers of a thoroughly scientific character, will be read by members of the society during the present session.

A BANK, commonly called Hafner, in the Lake of Zurich, and situated at a distance of a few thousand feet from the Mansion House Promenade, is now being minutely investigated by order of the town authorities. It appears that remains of a prehistoric pile dwelling are coming to light at this spot, consisting of a quantity of coarse and fine clay vessels, coals, a few bronze implements, &c. The piles upon which the old colony rested are particularly numerous.

THE additions to the Zoological Society's Gardens during the past week include a Chinese Rhesus Monkey (*Macacus lasiotus*) from Shanghai, presented by Messrs. John Morris and A. H. Brown; two Blue-eyed Cockatoos (*Cacatua ophthalmica*) from the Duke of York's Island, presented by the Rev. Geo. Brown, C.M.Z.S.; two Martinican Doves (*Zenaida martinicana*) from Grenada, W.I., presented by Capt. H. King; a Kittiwake Gull (*Rissa tridactyla*), European, presented by Mr. W. H. Cope, F.Z.S.; a Common Barn Owl (*Strix flammea*), European, presented by Mr. G. D. Edwards; a Jaguar (*Felis onca*) from South America, four Common Peafowls (*Pavo cristata*) from India, two Knots (*Tringa canutus*), four Widgeon (*Mareca penelope*), a Wild Duck (*Anas boschas*), two Scaup Ducks (*Fuligula marila*), European, purchased.

OUR ASTRONOMICAL COLUMN

PERIODICAL VARIATION IN THE BRIGHTNESS OF NEBULÆ.—In 1877, in a communication to the Royal Astronomical Society, Prof. Winnecke drew attention to the nebula H. II. 278, remarking that it appeared to exhibit not only a variability in its light, but, which he considered much more remarkable and difficult of explanation, that *periodical* fluctuations of brightness seemed to take place. A short time since he briefly pointed out a second case of similar character, in the nebula H. I. 20; in the last number of the *Astronomische Nachrichten* he returns to the subject, and collecting the descriptions of the latter nebula, presents very strong evidence of the variability of its light and indications that it may prove periodical.

H. I. 20 is No. 882 *h*, and No. 2405 of the General Catalogue: its position for 1880 is in R.A. 11h. 18m. 13s., N.P.D. 77° 59' 6", or it precedes B.A.C. 3882 by 34' 5s., and is 5' south of the star. A star 12m. follows at 2' 8s., 2' 1" to the north. Sir W. Herschel described it as "very bright" on March 15, 1785. Forty-five years afterwards his son found it "extremely faint," and remarked at the time: "This nebula must have changed greatly, if it ever belonged really to the 1st class." On April 4, 1831, he again found it faint. The next record of its appearance was made by Boguslawski, during his preparation of Hour XI. of the Star-charts of the Berlin Academy, when it appears,